

REMARKS

Reconsideration of the present application as amended is respectfully requested. Claims 1, 4, 6-9, 11, 13-14, and 17 have been amended. Claims 2 and 20 have been canceled. New claims 21 and 22 have been added. Support for the amendments made to the claims and the new claims can be found in at least Figures 1-9A and the associated description, and page 4, lines 9-11 of the description. Applicant submits that no new matter has been added. Claims 1, 3-14, 16-19, and 21-22 are currently pending.

Claims 1, 2, 4-13, and 15-20 stand rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 4,996,987 to Petrofsky ("Petrofsky"). In the outstanding Office Action, it is asserted that the feature of "an electro stimulation system for providing signals to a subject including at least one electrical power supply" is disclosed in Petrofsky (column 12, lines 38 to 46) as the "disclosed power supplies PS1 and PS2 are considered to anticipate the claimed power supply because both supply electrical signals to the skin of the subject."

Power supplies PS1 and PS2 of Petrofsky are described as being a pair of conventional bi-polar DC power supplies that are isolated from the circuit that comes into contact with the human body. In this respect, the DC power supplies are clearly shown in Figure 6 of Petrofsky as isolated from the sub-circuit 38 of Figure 6 where sub-circuit 38 is that part of the circuitry that contacts the skin of the subject. In particular, the part of the sub-circuit 38 in contact with human tissue is the secondary side of transformers 42A and 42B as detailed in Figure 6. Further, the signals provided by the secondary side of these transformers are not supplied directly by either power supply PS1 or PS2.

The function of PS1 and PS2 is to supply operating voltages to the remaining circuitry and in column 12, lines 41 to 43 of Petrofsky, both power supplies are described as conventional circuits of common use in many fields of electronics. Further, in column 12, lines 45 to 46, PS1 is described as supplying +5V to the digital logic circuitry (as is conventional) and in lines 47 to 49, PS2 is described as providing a source of power to the amplifiers 156, 157, 40A and 40. In this respect, it should be noted that the amplifiers of Petrofsky are not disclosed as being connected directly to the tissue of a subject nor is there any suggestion or motivation for

directly connecting the output of these amplifiers to the tissue of a subject as compared with the secondary side of the transformers 42A and 42B.

Accordingly, the Applicant respectfully submits that the power supplies disclosed by Petrofsky are not adequate nor appropriate for direct connection to the tissue of a subject undergoing electro stimulation treatment. Furthermore, with reference to the amendments made to independent claim 1, it will be recognized that the apparatus of claim 1 now includes the feature of an electrical power supply connected to an electrical current control circuit such that electrical currents supplied to the subject is controlled. In this respect, the Applicant further submits that the power supplies disclosed by Petrofsky do not teach or suggest any connection to an electrical current control circuit for the purpose of controlling electrical current supplied to a subject.

The Office Action further asserts that the feature of "a first switching device for intermittently connecting the output of an electrical power supply to one or more connection probes electrically connected to the subject thus reforming active probes" is disclosed in Petrofsky (column 3, lines 30-40, column 4, lines 25-35 and column 9, lines 25-30). Independent claim 1 as amended includes the feature of "a first switching device for intermittently connecting an output of the at least one electrical power supply to one or more of the connection probes thereby causing said one or more connection probes to become active probes". With reference to the identified portions of Petrofsky, the Applicant cannot identify any particularly relevant disclosure in column 3, lines 30-40 apart from the description indicating that therapeutic currents to be applied to the muscle are typically conducted over wires coupled to electrodes which are adhered to the skin over the muscle to be stimulated. The subsequent description by Petrofsky of an electrode coming loose from the skin and the potential for arcing does not appear relevant to the claimed feature of a "first switching device...".

With respect to the disclosure in Petrofsky at column 4, lines 25 to 35, the Applicant respectfully submits that the disclosed switches 30A and 30B do not intermittently connect the outputs of the signals and hence do not form an electrical current return path. In Figure 1 of Petrofsky it can clearly be seen that the signal path is permanently connected to the tissue of a subject as is the return path via transformer 42, wires 44 and connection electrodes 46. Further,

the purpose of switches 30A and 30B are described in Petrofsky as being to determine whether the signal 22 or 24 (as detailed in Figure 6) is connected through the switch to the amplifier 40A and 40B. Further, the Applicant submits that the disclosure in Petrofsky at column 9, lines 25-30 does not disclose a circuit directly connecting a signal to the tissue of a subject nor does it disclose connection of a probe to a current return path.

In this instance, the Applicant submits that Petrofsky only discloses a current return path through the transformer secondary coil of 42, wires 44, electrodes 46 and through the tissue being stimulated. Further, the disclosure of Petrofsky at column 9, lines 30 to 45 clearly describes the switch 30A and 30B as being used to select between signal sources only. The signal sources are referred to as the desensitising signal at first, then on activation of the switching signal, it is referred to as the FES signal. The Applicant submits that this arrangement is clearly not the same as a switch which isolates and disconnects the electrical connection of a probe to any associated circuitry.

Applicant further submits that the teaching of Petrofsky is further reinforced in Figure 2 which clearly identifies the generation of signals in the form of alternating current signals which, by definition, reverse polarity over time and therefore do not require any external mechanism for the purpose of altering the state of a connection probe from being an active probe to a current return path probe. Accordingly, Applicant respectfully submits that the feature as claimed in independent claim 1 of "a first switching device for intermittently connecting an output of the at least one electrical power supply to one or more of the connection probes thereby causing said one or more connection probes to become active probes" is not disclosed in Petrofsky.

The Office Action also asserts that the feature in claim 1 of "a second switching device for intermittently connecting one or more connection probes electrically connected to the subject to form an electrical current return path for currents supplied by the electrical power supply" is disclosed in Petrofsky at column 4, lines 25 to 35 and column 9, lines 25 to 30. Independent claim 1 as amended includes the feature of "a second switching device for intermittently connecting one or more of the connection probes to at least one electrical current return path thereby causing said one or more connection probes to become return path probes."

In this respect, the Office Action asserts that the disclosed device in Petrofsky is considered to anticipate the claimed switching device because both control the output from the electrical power supply that is connected to a current control circuit. The Office Action also asserts that the amplified voltage driving signals as disclosed in Petrofsky are coupled to respective switches to define a two-channel stimulator.

The Applicant's remarks in relation to the disclosure of Petrofsky with respect to the claimed feature of "a first switching device" and the intermittent connecting of probes causing the probes to become active probes equally apply to the claimed "second switching device" and the intermittent connection of probes causing the probes to become return path probes. In any event, despite the description in Petrofsky of a switch 30 to ultimately control the application of a signal through the secondary of a transformer to the tissue of a subject, the switching arrangement disclosed by Petrofsky clearly does not allow for the independent activation of signals to individual probes that are connected to the tissue of the subject.

Further, we respectfully draw the Examiner's attention to the amendments to claim 1 and claim 4 such that these claims include the feature of "at least three connection probes electrically connected to the subject and spatially arranged such that any electrical current flowing between the respective connection probes establishes electrical current flows through differing paths through the subject" (claim 1 as amended) and "at least three spatially arranged electro stimulation probes..." (claim 4 as amended). These amendments provide a clear distinction between the presently claimed invention of claim 1 and 4, and the disclosure of Petrofsky given that Petrofsky does not disclose the spatial arrangement of connection probes for the purpose of establishing electrical current flows through different paths through the tissue of a subject during treatment. For the reasons set out above and in view of the amendments made to claims 1 and 4 to include at least three connection probes for spatial distribution of electrical currents through the tissue of a subject, the Applicant respectfully submits that Petrofsky does not disclose all of the features of claims 1 and 4.

Regarding claims 4-12, the Office Action asserts that Petrofsky is considered to disclose all of the features of these claims in the passages of Petrofsky at column 12, lines 38-46 and column 13, lines 40-45. With respect to the disclosure of Petrofsky at column 12, lines 38-

46, the Applicant refers to their aforementioned comments pertaining to the disclosed power supplies PS1 and PS2. With reference to the disclosure of Petrofsky at column 13, lines 40-45, the Applicant submits that this passage only describes the selection of one of two available signals at a signal source and does not describe the selection of individual probes for connection to either an electrical power supply or a current return path.

Further, in view of the amendments to claim 4 wherein the feature of "at least three spatially arranged electro stimulation probes" has been introduced with the purpose being "the spatial arrangement of probes causing any electrical current flowing between the probes to flow through different paths through the subject", the Applicant contends that these amendments further distinguish the claimed invention as compared with the disclosure in Petrofsky as Petrofsky clearly does not disclose the independent connection of individual probes that are spatially arranged and electrically connected to the subject and altering the connection of individual probes during a treatment such that electrical currents are caused to flow through different paths through the subject.

Accordingly, in view of the amendments to claim 4, the Applicant contends that this claim distinguishes over the disclosure of Petrofsky. Further, given that claims 5-12 are dependent upon claim 4 and introduce additional features to those defined in claim 4, the Applicant respectfully submits that claims 5-12 also distinguish over Petrofsky.

The Office Action asserts that claims 13 and 15-20 are disclosed by Petrofsky and again refers to the passage at column 3, lines 33 to 40. The Applicant respectfully draws the Examiner's attention to the enclosed claim amendments that include the deletion of claim 20. Accordingly, the Applicants comments are directed to claims 13 and 15-19.

The Office Action explains that the disclosed electrodes in Petrofsky are considered to anticipate the claimed probes because both are in electrical connection with the subject of the treatment and are spaced in a manner to allow the application of electrical signals to the active probes to cause flow of electrical current through the area of the body between the probes. With reference to the cited passage of Petrofsky at column 3, lines 33-40, this passage describes a system for the application of therapeutic currents to a muscle and indicates that it is not uncommon for an electrode to come loose from the skin or lose adhesion thereto. Further, this

passage indicates that when an electrode comes loose, continued application of a therapeutic current could result in arcing which may cause pain or injury to the user.

However, the Applicant respectfully draws the Examiner's attention to the fact that this passage does not disclose many of the features found in claims 13 and 15-19. In this respect, the Applicant can find no disclosure in Petrofsky of a controlled electrical signal for supplying electrical currents to a subject by connection of at least three connection probes. More particularly, with reference to pending claim 13, the Applicant cannot find any disclosure in Petrofsky of a first electrical resistance connected in parallel with active and return path probes with the junction between the return path probe and the first resistance connected to a ground reference through a controllable variable conductance network including a conductance path formed by a collector-emitter path through a transistor in series connection with a second electrical resistance such that the voltage of the junction of the emitter and the second resistance varies proportionally with the electrical current flowing through the area of the subject between the active and return path probes.

While the cited passage in Petrofsky identifies the need to provide a safety circuit to prevent injury and/or damage to a subject in the event that a connection probe becomes loose, the disclosed solution in Petrofsky only contemplates the provision of a lower level signal as compared with the "therapeutic signal" to prevent such injury. The disclosure of Petrofsky only contemplates a constant current circuit and as such, any disconnection of an electrode will result in an increase in impedance. In accordance with Ohms law, as impedance increases so must the voltage if current is to remain constant. It is as a result of this circuit arrangement as disclosed by Petrofsky that a loose electrode can result in a substantial increase in voltage and the possibility of arcing between the poorly connecting electrode and the tissue of the subject.

In contrast, the invention defined in claim 13 relates to a control of the supply of electrical current that accommodates any change to the impedance presented to the electrical power supply. This is effected by connecting the junction between the return path probe and the first resistance to a ground reference through a controllable variable conductance network that itself includes a conductance path formed by a collector-emitter path through a transistor in series connection with a second electrical resistance. This results in a voltage at the junction of

the emitter and the second resistance varying proportionally with the electrical current flowing through the area of the subject between active and return path probes.

As the invention defined in claim 13 is not disclosed by Petrofsky, the Applicant respectfully submits that claim 13 distinguishes over the disclosure in Petrofsky. Further, as claims 16-19 are dependent upon claim 13, the Applicant submits that these dependent claims also distinguish over Petrofsky for at least the reasons as discussed with respect to claim 13.

For at least the foregoing reasons, the Applicant respectfully submits that claims 1, 4-13, and 16-19 distinguish over Petrofsky and requests that the 35 U.S.C. 102(b) rejections of claims 1, 4-13, and 16-19 be withdrawn.

Claim 3 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Petrofsky in view of U.S. Patent No. 6,632,296 to Parramon et al. ("Parramon"). In this respect, the Office Action asserts that Petrofsky is considered to disclose the claimed invention except for the claimed multiplexing device. Further, the Office Action considers the multiplexing device to be disclosed in Parramon in the passage at column 2, lines 10 to 20 and that it would have been obvious to one of ordinary skill in the art to combine the teachings of Petrofsky with the multiplexing scheme found in Parramon.

Claim 3 is dependent upon and includes the features of independent claim 1. For the same reasons set out previously, the Applicant submits that Petrofsky does not disclose various features defined in claim 1 and in particular, for example, does not disclose the connecting of an output of at least one electrical power supply to one or more connection probes and connection of one or more of the connection probes to an electrical current return path. Despite the failure of Petrofsky to disclose these features defined in claim 1, pending claim 3 (dependent upon claim 1) further defines the switching devices that intermittently connect one or more probes to either the output of an electrical power supply or to an electrical current return path as multiplexing devices each connected to a multiplexing control device. Clearly, claim 3 defines the multiplexing devices as the means for connecting the connection probes to the power supply and/or electrical current return path.

In distinct contrast to the invention of claim 3, the teaching of Parramon relates to the use of a time-multiplexing scheme as a solution to the problem of providing charging power to an implanted RF coil whilst also providing for the receipt of an RF signal. In this instance, Parramon teaches the inclusion of a time-multiplexing scheme so that the number of components needed within the device is minimised and thus allows the device to be packaged in a smaller housing or frees up additional space within an existing housing for other circuit components (see column 2, lines 17-20 of Parramon). The Applicant respectfully submits that the disclosure in this passage of Parramon does not disclose the feature identified in pending claim 3, namely, a multiplexing device for the connection of probes to either an electrical power supply or electrical current return path.

Accordingly, in view of the failure of the combination of the disclosure of Petrofsky and Parramon to disclose each and every one of the features of pending claim 3, and the failure of Parramon to provide any teaching, or motivation to include a multiplexing device in the teaching of Petrofsky, the Applicant respectfully submits that pending claim 3 distinguishes over Petrofsky in view of Parramon and requests that the 35 U.S.C. 103(a) rejection of claim 3 be withdrawn.

Claim 14 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Petrofsky in view of U.S. Patent No. 5,514,165 to Malaugh et al. ("Malaugh"). The Office Action asserts that claim 14 is unpatentable in view of the teaching of Petrofsky combined with the teaching of Malaugh. In this respect, the Office Action further asserts that Petrofsky discloses the claimed invention except for the claimed significantly greater first electrical resistance.

Claim 14 is dependent upon and includes the features of independent claim 13. With reference to the previous comments in relation to the features of claim 13, the Applicant maintains that Petrofsky does not disclose the invention as defined in claim 13. This is particularly in view of the amendments to claim 13 that include the features of a controlled electrical signal for supplying electrical currents to a subject that includes at least three connection probes with each probe operable as an active, return path or disconnected probe. Further, as previously detailed, the Applicant cannot identify any disclosure in Petrofsky of a

junction between a return path probe and a first resistance being connected to a ground reference through a controllable variable conductance network that itself includes a conductance path formed by a collector-emitter path through a transistor in series connection with a second electrical resistance.

Despite Petrofsky failing to disclose all of the features defined in claim 13, the Applicant also contends that the teaching of Malaugh is limited to a circuit that is used to detect an over limit voltage and subsequently deactivate the power supply in the event that a voltage greater than the limit voltage is detected. In contrast to the teaching of Malaugh, claim 14 defines the structure of a circuit where the voltage at the junction of the emitter and the second resistance can be used to generate a control signal for the base input of the transistor which in turn affects the conductance path formed by the collector-emitter path of the transistor and hence controls the electrical current flow between active and return path probes connected to the tissue of a subject. Although the first electrical resistance connected in parallel with active and return path probes is included, and selected to have an electrical resistance significantly greater than the expected electrical resistance between an active and return path probe in the area of the subject, for the purpose of reducing any "stinging" sensation upon first application of the probes to the tissue of a subject, the fundamental operation of the circuit structure defined in claim 14 is substantially different to the teaching of Petrofsky even in combination with the teaching of Malaugh. Accordingly, as the combination of Petrofsky and Malaugh fails to teach all of the features of claim 14 and provides no motivation or suggestion to combine the respective teachings, the Applicant respectfully submits that claim 14 distinguishes over Petrofsky in view of Malaugh and requests that the 35 U.S.C. 103(a) rejection of claim 14 be withdrawn.

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In view of the above amendment, Applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

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